IN THE CLAIMS

Please amend the claims as follows:

Claim 1 (Withdrawn): A chemical reactor for nitrogen oxide emission control, comprising a electrochemical cell with a four-layer structure consisting of an upper cathode (catalyst reaction component) and a lower cathode (positive electrode) composed of an electron-conductive substance and an ion-conductive substance, a solid electrolyte having oxygen ion conductivity, and an anode (negative electrode), wherein the volumetric ratio of the electron-conductive substance and ion-conductive substance that make up the upper cathode is from 3:7 to 7:3.

Claim 2 (Withdrawn): The chemical reactor according to Claim 1, wherein the volumetric ratio of the electron-conductive substance and ion-conductive substance that make up the upper cathode is from 3:7 to 5:5.

Claim 3 (Withdrawn): The chemical reactor according to Claim 1 or 2, wherein the electron-conductive substance of the upper cathode is composed of nickel and nickel oxide, and the ion-conductive substance is composed of zirconia stabilized with yttrium oxide or scandium oxide.

Claim 4 (Withdrawn): The chemical reactor according to Claim 1, wherein the electron-conductive substance of the lower cathode is composed of platinum and/or palladium, and the ion-conductive substance is composed of zirconia stabilized with yttrium oxide or scandium oxide.

Claim 5 (Withdrawn): The chemical reactor according to Claim 1, wherein the solid electrolyte is composed of zirconia stabilized with yttrium oxide or scandium oxide.

Claim 6 (Withdrawn): The chemical reactor according to Claim 1, wherein the anode is composed of an electron-conductive substance and an ion-conductive substance, and the volumetric ratio of the electron-conductive substance and ion-conductive substance is from 3:7 to 7:3.

Claim 7 (Withdrawn and Previously Presented): The chemical reactor according to Claim 1, wherein the electron-conductive substance of the anode is composed of platinum and/or palladium, and the ion-conductive substance is composed of zirconia stabilized with yttrium oxide or scandium oxide.

Claim 8 (Withdrawn and Previously Presented): A method for the emission control of nitrogen oxides with the chemical reactor according to Claim 1, wherein nitrogen oxides are emission-controlled at the upper cathode by applying voltage between the lower cathode and the anode of the electrochemical cell.

Claim 9 (Withdrawn): A chemical reactor for subjecting a treatment substance to a chemical reaction, comprising a chemical reaction layer where the chemical reaction of the treatment substance proceeds, and an electrode layer that is adjacent to the chemical reaction layer, the electrode layer having the function of conducting electrons to the chemical reaction layer and conducting to outside the system ionized elements produced in the chemical reaction layer.

Claim 10 (Withdrawn): The chemical reactor according to Claim 9, wherein the electrode layer is composed of an oxide, a metal, or a mixture of both.

Claim 11 (Withdrawn): The chemical reactor according to Claim 9, wherein the electrode layer is composed of an electron-conductive phase that conducts electrons given for ionizing elements contained in the treatment substance in the chemical reaction layer, and an ion-conductive phase that conducts elements ionized by the chemical reaction.

Claim 12 (Withdrawn): The chemical reactor according to Claim 9, wherein the mixing ratio of the ion-conductive phase and the electron-conductive phase in the electrode layer is in the range of ion-conductive phase:electron-conductive phase = 3:7 to 7:3.

Claim 13 (Withdrawn): The chemical reactor according to Claim 9, wherein the treatment substance is a nitrogen oxide, the nitrogen oxide is reduced into oxygen ions in the chemical reaction layer, and the oxygen ions are conducted in the ion-conductive phase of the electrode layer.

Claim 14 (Withdrawn): A method for removing nitrogen oxides in an exhaust gas with an electrochemical cell that decomposes or removes nitrogen oxides, wherein exhaust gas from a combustor is pretreated in advance with a nitrogen oxide adsorption material that adsorbs nitrogen oxides at low temperatures until the temperature of the exhaust gas rises, and releases nitrogen oxides at high temperatures after the temperature of the exhaust gas has risen, and this pretreated exhaust gas is treated with an electrochemical cell.

Claim 15 (Withdrawn): The method for removing nitrogen oxides according to Claim 14, wherein pretreatment is performed using a nitrogen oxide adsorption material that adsorbs nitrogen oxides at low temperatures from room temperature up to 400°C, and releases nitrogen oxides at high temperatures over 400°C.

Claim 16 (Withdrawn): A nitrogen oxide removal system, wherein a nitrogen oxide adsorption component composed of a nitrogen oxide adsorption material is provided at the upstream part of an electrochemical cell that decomposes or removes nitrogen oxides in an electrochemical cell component made up of said electrochemical cell.

Claim 17 (Withdrawn): The nitrogen oxide removal system according to Claim 16, which is an apparatus for decomposing or removing nitrogen oxides using an electrochemical cell comprising at least three layers, consisting of a solid electrolyte of an oxygen ion conductor, a cathode, and an anode, wherein a nitrogen oxide adsorption component is provided ahead of the gas inlet of said apparatus.

Claim 18 (Withdrawn): The nitrogen oxide removal system according to Claim 16, wherein the nitrogen oxide adsorption component is composed of a nitrogen oxide adsorption material that adsorbs nitrogen oxides at low temperatures from room temperature up to 400°C, and releases nitrogen oxides at high temperatures over 400°C.

Claim 19 (Currently Amended): A chemical reactor for subjecting a ~~treatment~~ substance to be treated to a chemical reaction, the reactor comprising:

a chemical reaction component; and

an ionization reaction inhibition layer located as an intermediate layer or a mixed layer or a surface coating layer disposed on a surface of the chemical reaction component, wherein

the chemical reaction component comprises a reduction phase comprising a substance of mixed conductivity, an ion-conductive phase comprising a substance having ionic conductivity, and an oxidation phase comprising a substance having both electron conductivity and ion conductivity, in order, and

the ionization reaction inhibition layer or the surface coating layer is configured to inhibit an ionization reaction of adsorbed oxygen by inhibiting or blocking a conduction path of ionization current.

Claim 20 (Previously Presented): The chemical reactor according to Claim 19, wherein the surface coating layer comprises an ion-conductive substance, a mixed conductive substance, or an insulating substance.

Claim 21 (Currently Amended): The chemical reactor according to Claim 19, wherein the chemical reaction component comprises a reduction phase configured to produce ions by supplying electrons to elements contained in the treatment substance,

[[an]] the ion-conductive phase configured to conduct the ions from the reduction phase, and

[[an]] the oxidation phase configured to release electrons from the ions conducted through this ion-conductive phase.

Claim 22 (Currently Amended): The chemical reactor according to Claim 19, wherein the ~~treatment~~ substance to be treated is nitrogen oxide,

the nitrogen oxide is reduced into oxygen ions in the reduction phase, and the oxygen ions are conducted in the ion-conductive phase.

Claim 23 (Previously Presented): The chemical reactor according to Claim 19, wherein the surface coating layer includes a structure or material configured to block the conduction path by which current supplied from the outside to the chemical reaction component reaches the adsorption point of oxygen molecules.

Claim 24 (Previously Presented): The chemical reactor according to Claim 19, wherein the surface coating layer is disposed on the uppermost layer of the chemical reaction component.

Claim 25 (Previously Presented): The chemical reactor according to Claim 21, wherein the ion-conductive phase is sandwiched between the reduction phase and the oxidation phase, and the reduction phase is disposed above the ion-conductive phase and the oxidation phase.